PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Arctic Energy Office

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RURAL ALASKA COALBED METHANE: APPLICATION OF NEW TECHNOLOGIES TO EXPLORE AND PRODUCE ENERGY

PARTNERS

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U.S. Geological Survey
Denver, CO

MAIN SITE

Fort Yukon, AK
Houston, AK

Background/Problem

Producing methane, the main constituent of natural gas, from coals is an increasingly important component of the Nation's energy supply. Most current coalbed methane (CBM) production in the U.S. is in the Rocky Mountain, Midcontinent, and Appalachian regions. A vast, untapped potential CBM resource also exists in Alaska: Estimates put the state's CBM resource in place at 1,000 trillion cubic feet.

Mindful of that potential, Alaska's Division of Geological & Geophysical Surveys, with funds from the U.S. Bureau of Land Management, studied CBM potential in rural Alaska and identified 38 rural villages on or near coal resources. Exploiting that nearby CBM resource could provide a long-term source of low-cost, clean energy to rural Alaskans, who usually must rely on diesel-fueled generators for heat and power. The logistics of supplying liquid fuels to these remote locations drive rural Alaskans' energy costs to more than fivefold those in Fairbanks and Anchorage.

But there are hurdles to overcome in achieving this goal:

- Are Alaska's young, low-rank coals able to yield commercial CBM volumes?
- Can drilling costs in remote areas of Alaska-pegged at tenfold those of equivalent wells in the Lower 48 states because of logistical challenges and environmental sensitivities-be reduced significantly?
- Will CBM producers in rural Alaska be able to sustain economic gas production rates and manage produced-water volumes?

Project Description/Accomplishments

The project called for a three-year program to test the producibility of low-rank coals at Fort Yukon, Alaska, using slimhole drilling technology that sharply reduces mobilization and drilling costs. Success of initial drilling and testing results would lead to development of an innovative production scheme whose feasibility would be borne out in the second and third years of the program. Once deemed feasible, the production phase would yield data on gas and water flow rates; gas content; coal seam properties; drilling, completion, and stimulation techniques; and pumping and injection systems for dewatering and water management.

First, however, it was necessary to conduct an economic analysis of fuel gas and surface facility requirements for Fort Yukon, a village with a population of 650 about 120 miles northeast of Fairbanks. Such analysis considered a facility design concept

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COST

Total Project Value
$2,053,699

DOE/Non-DOE Share
$1,049,997/$1,003,672

CUSTOMER SERVICE

1-800-553-7681

WEBSITE

www.netl.doe.gov

that includes gas processing and distribution facilities. The study concluded that Fort Yukon would need 250-450 Mscfd of gas through 2015; the village's conversion to CBM from diesel would cost $5-7 million; and, at $8/MCF, the overall rate of return for such a project would be 3-12%, depending on tax treatment and ultimate project cost.

On the operations side, plans called for a 2004 summer program to reenter a climate hole drilled by the U.S. Geological Survey in 1994, drill to the first coal horizon, recover core from the coal seams, measure gas content, and conduct hydrologic tests to determine coal seam permeability. Of critical concern is the ability to manage produced waters in rural arctic-to-subarctic environments and to produce water-saturated gas at subfreezing temperatures.

Field Demonstration Results

The program's Phase I field season was completed at the Fort Yukon site, with drilling getting under way Aug. 21, 2004, and coring of the first coal beginning 5 days later at a depth of about 1,280 feet. Coal cores were collected to analyze gas content and composition, and coal seam water was sampled for chemical analysis. A second coal seam was cored Sept. 1 at a depth of about 1,905 feet, reaching a final hole depth of 2,287 feet on Sept. 3. In coming months, the core samples will be assessed for methane content, formation transmissivity, and water quality. Data collected will help underpin further economic modeling.

Slimhole drilling is shown under way at the Fort Yukon, Alaska, coalbed methane prospect on August 25, 2004.

If information gleaned from Phase I is favorable, plans call for additional slimhole production testing and analysis to begin in summer 2005. The production concept envisions a five-spot pattern of closely spaced, small-diameter wells-a central production well surrounded by four dewatering wells. This production scheme would be implemented near Houston, Alaska, with production data modeled alongside Fort Yukon well data.

A final, peer-reviewed project report on the application and feasibility of small-diameter CBM well technology in rural Alaska is due at the end of Fiscal Year 2005.

Benefits/Impacts

Preliminary results of gas content analyses put the Fort Yukon coals' gas saturation levels at an average 20-30%, with a maximum of 50% in one canister.

Such low gas saturation levels might mandate drilling a greater number of wells or pumping large volumes of water from the coal seams in order to sustain commercial gas production. Early analysis supports water potability.

One side benefit of the project may help improve the local environment while cutting project costs. The project team is seeking approval from the Alaska Department of Environmental Conservation to spray drilling waste over an old landfill near the site, a step that could help seal the landfill in order to close it out.